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Citation:

Zulu, SL (2015) Factors impacting of time and cost performance in the Zambian Construction Industry. In: Eighth International Conference on Construction in the 21st Century (CITC-8), 27 May 2015 - 30 May 2015, Thessaloniki, Greece.

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Document Version:

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# **Factors Impacting of Time and Cost Performance in the Zambian Construction Industry**

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## **Abstract**

This research seeks to provide an understanding of factors that contribute to the success and failure of construction projects in Zambia. In particular it focuses on factors impacting on time and cost performance. It is recognised that many studies on this subject have been undertaken focusing on specific countries recognising the importance of national industry specific characteristics as possible contributors to the differences in the perception of factors that impact on project performance. A focus on the Zambian construction industry was there deemed appropriate as the focus of this study. The study is based on an online questionnaire survey to construction professionals in the Zambian construction Industry. This enabled capture of required data from a large target audience. The questionnaire was developed after an extensive literature review on factors impacting on project performance. The findings suggest that all the key participants on construction projects, employers, contractors and consultants play a key role in influencing time and cost performance of construction projects in the Zambian construction industry. Factors such as employer financial difficulties, construction project and site management and unethical behavior were perceived to be significant contributors of poor time and cost performance. The study acknowledges the limited literature on the Zambian Construction Industry and in particular issues concerning the performance of projects. Of particular interest in this paper is the comparison of factors between Zambia and that reported about other countries? By taking a Zambian specific analysis of key factors time and cost contributing factors, this study adds to the list of countries which have been investigated.

## **Keywords**

Project Performance, Critical Success Factors, Project management, Zambia.

## **1. Introduction**

The Zambian construction industry like many other countries, contributes significantly to the nation's economic performance. Its contribution of over 10% to DGP and about 3% to employment (Zulu & Chileshe, 2010) are important indicators of the importance of the industry. Over the years there has been a marked increase in the industries contribution to GDP due to both increased infrastructure spending by the government and an increase in foreign capital inflow. For example between 1995 and 2006 the construction industry grew about 4 fold from a contribution to GDP of 3.5% to 13.9% (Zulu and Chileshe, 2010). The composition of the Zambian construction industry is generally recognised to comprise five main sectors including manufacturing, design, construction, supply and clients. (Shakantu, Zulu and Matipa, 2002). The investigation in this study focuses on the design and construction sectors. The design sector comprises of professional consultancy services such as architects, quantity surveyors, civil engineers and structural engineers, while the construction sector include both main contractors and subcontractors.

The regulation of the construction industry is significantly undertaken by the National Construction Council to which both design professions and contractors are required to register with. In addition professional bodies such as the Surveyors institute of Zambia, the Zambia Institute of Architects and the Engineering Institute of Zambia play a significant role in regulating the construction industry professions. As indicated above there has been a significant growth of construction activity over the years. One of the major concerns however has been the significant number of projects which fail to meet, time, cost and quality performance criteria. Reports of projects failing to meet key performance criteria are not uncommon (Zulu and Chileshe, 2010). This paper therefore seeks to examine the factors that contribute to project failure in the Zambian construction industry.

The paper reports findings as part of a wide scale project seeking to profile the Zambian construction industry. Many studies have been conducted to understand what factors impact on project performance. Many studies have sort to understand factors from a country perspective (see for example Frimpong et al (2003) and Sambasivan and Soon (2007)). Others have provided a comparative analysis between countries. Xiao and Proverbs (2002) for example provided a comparative analysis of factors between the UK, USA and Japan. The examination of factors based on project types has also been widely considered. For example Al-Kharashi and Skitmore (2009) took a specific project type context to examine factors impacting on project performance. The research will contribute to this debate and take a country perspective and examines factors contributing to project performance in the Zambian construction industry. Before the findings are reported, the paper will start by providing an overview of literature on factors impacting on construction project performance.

## **2. Factors impacting on project performance**

As indicated above there have been many studies that have been undertaken to understand factors that impact on construction project performance. Such studies can also be related to wider literature on critical success factors in project management. The debate as to whether project management in general and construction project management in specific brings about the delivery of projects to the client satisfaction put the project management profession under scrutiny. As clients are demanding better value for money there is need to show the value of construction professional services in projects. A lot of research has been done to look at this aspect. Project management research has looked at causes of project failure and also identification of best practices (Goldstein, 2001). Ibbs and Kwak (2000) and Morris (2000) among others all consider that with the increased use of PM, there is a need to show the benefit of using PM. The construction industry has not escaped such evaluations. This is particularly important considering the significant number of projects globally that fail to meet the expected client targets. It is against this background that studies on factors impacting on construction project performance have been undertaken.

There have been many studies that have taken a country specific approach to understand specific factors impacting on a nation's construction industry project performance. This includes among others: India (Iyer and Jha, 2005), Taiwan (Toor and Ogunlan, 2007), United Arab Emirates (Faridi and El- Sayegh, 2006), Indonesia (Sugihato and Keith, 2003), Ghana (Frimpong, Oluwoye and Crawford, 2003), Malaysia (Sambasivan and Soon, 2002) and Saudi Arabia (Khorashi and Skitmore, 2009). Others examined failure/success factors on projects with specific characteristics such as web-based construction project management (Nitithamyong and Skibniewski, 2006), housing projects (Ahadzie and Proverbs, 2008), major construction projects (Toor and Ogunlana, 2008), groundwater projects in developing countries (Frimpong, Oluwoye and Crawford 2003); infrastructure projects (Sing (2009) and transport projects (Flyvbjerrg, Holm and Buhls 2004).

What is interesting in the studies are the differences in the ranking of factors depending on country or project type. Xiao and Proverbs (2002) compared contractor performance between United Kingdom,

United States of America and Japan. They found that the three countries displayed differences in cost performance. Factors such as contractor-client relationships, degree of standardisation and mechanisation were deemed to be probable factors contributing to the differences. Le-Hoal, Lee and Lee (2008) compared factors causing delay and cost overruns in several countries. Their listing of factors in relative importance terms seems to be different between different studies/countries. For example the most important factor in a Vietnam study was found to be poor site management and supervision, improper planning in Malaysia, change orders in Kuwait, monthly payment difficulties in Ghana and contractor financial difficulties in Nigeria. It can therefore be concluded that the factors impacting on construction project performance in different countries is in many ways dependent on local industry characteristics. The present research contributes to this debate and focuses on the Zambian construction industry. The argument being that the factors impacting on the Zambian Construction Industry are representative of its own characteristics.

### **3. Methodology**

The study was based on a questionnaire survey similar to many other studies in this area. An online questionnaire was prepared and respondents were sent an email invitation to answer the questionnaire with an appropriate internet link. In addition invitations were sent through online forums to targeted potential respondents. The implication of this approach therefore implied that an accurate population size could not be determined. However considering that a large section of the population was contacted, it is deemed here that the sample is representative of the population. The targeted sample was design professionals (including Architects, Quantity Surveyors, Project Managers and Civil and Structural Engineers) and Contractors. A total of 41 responses were received. The use of questionnaires as a method to collect data was considered most appropriate for this study. Although other methods exist for collection of data, such as interviews, and documentary research, the use of online questionnaire was considered most appropriate for this research, principally based on two strength points for questionnaires. Firstly the nature of the investigation suits questionnaire survey as it is able to collect large amount of data in a shorter time than interviews (Kumar, 1996 and Burns, 2000) as the purpose of the study was to investigate the wider perception of industry participants the performance contributing factors. Secondly, the geographical setting of the respondents throughout the country implied that the use of questionnaires would be most appropriate method for the study.

The research instrument used by Hoal, Lee and Lee (2008) was adopted. This was appropriate as the authors provided a comparative between factors in Vietnam and other countries. As such it provides an appropriate benchmark instrument and findings for the present study. The instrument has 22 possible factors that would impact on construction time and cost performance. This was appropriate as the items were used to compare findings from different countries. In addition a factor relating to unethical behaviour was included. This was deemed appropriate as it is generally accepted that unethical behaviour in its many forms can result in poor performance. Kenny (2006) for example suggest that while bribes that are paid in order to win contracts that are subsequently well-constructed are less damaging, sometimes corruption can lower construction standards. While this factor is rarely included in studies on impacting factors, it is something worthwhile including considering the prominence of discussion on ethical standards in the global construction industry. Table 1 shows the list of factors that were included in the questionnaire. While the factors are grouped into five categories in the analysis below, they were not differentiated in the questionnaire to avoid the blame game. Le- Hoal, Lee and Lee (2008) grouped the factors into six categories including contractor, employer, consultant, material/labour, external & project. This research adopted a modification to the listing and combined the contractor, and material/labour categories.

**Table 1: Performance impacting factors**

All Parties	<ul style="list-style-type: none"> <li>• Unethical Practices</li> </ul>
Consultants	<ul style="list-style-type: none"> <li>• Poor project management assistance</li> <li>• Slow inspection of completed works</li> <li>• Inaccurate estimates</li> <li>• Poor contract management</li> <li>• Mistakes in design</li> </ul>
Contractors	<ul style="list-style-type: none"> <li>• Poor site management and supervision</li> <li>• Incompetent subcontractors/contractor</li> <li>• Mistakes during construction</li> <li>• Financial difficulties of contractor</li> <li>• Shortages of skilled workers</li> <li>• Shortages of materials</li> <li>• Obsolete or unsuitable construction methods</li> </ul>
External	<ul style="list-style-type: none"> <li>• Price fluctuations</li> <li>• Bad weather conditions</li> <li>• Obstacles from government (Government Projects)</li> </ul>
Employer	<ul style="list-style-type: none"> <li>• Financial difficulties of owner (on Government projects)</li> <li>• Financial difficulties of owner (on private funded projects)</li> <li>• Slow payment of completed works</li> </ul>
Project	<ul style="list-style-type: none"> <li>• Design changes</li> <li>• Slow information flow between parties</li> <li>• Additional works</li> <li>• Unforeseen</li> </ul>

## 4. Analysis of findings

### 4.1 Characteristics of Respondents

Table 2 below shows the make-up of the respondents. As can be observed the majority of the respondents were quantity surveyors. This is followed by Contractors and Project Managers. Due to the relatively small numbers in the other categories, it was deemed appropriate not to segregate responses according to the respondent categories. The implication of the differences will be alluded to where appropriate.

**Table 2: Sample demography**

Respondent Category	Percentage
Architects	12%
Quantity Surveyor	63%
Contractors	12%
Engineers	3%
Project managers	3%
Other	7%

## 4.2 Project Performance

Before evaluating factors that cause project performance, participants were asked to indicate their perception of the frequency of project failure in terms of time, cost and quality performance. As can be seen from table 3, the frequency of project failure ranges from occasional to very frequent. Both time and cost performance had over 60% frequent/very frequent occurrence of failure. Significantly poor quality performance is not uncommon. However quality performance is not included in further analysis in this paper. Considering the frequency of project failure, it is important that factors impacting on project failure should be understood for the Zambian construction industry to improve.

**Table 3: Perception of project performance**

Frequency of Failure to Meet Target						
	Never	Very Rarely	Rarely	Occasionally	Frequently	Very Frequently
Time	0%	0%	2%	23%	39%	35%
Cost	0%	3%	0%	35%	52%	10%
Quality	0	13	10	35	16	26

## 4.3 Factors Contributing to Poor Time & Cost Performance

Table 4 below show the relative ratings of the factors causing poor time and cost performance on construction projects in order of their ranking.

**Table 4: Ranking of impacting factors**

Factor	Group	Mean
Financial difficulties of owner (on private funded projects)	Employer	3.80
Mistakes during construction	Contractor	3.70
Unethical Practices	All	3.63
Poor site management and supervision	Contractor	3.58
Price fluctuations	External	3.58
Financial difficulties of owner (on Government projects)	Employer	3.57
Poor project management assistance	Consultant	3.36
Mistakes in design	Consultants	3.23
Slow payment of completed works	Employer	3.21
Design changes	Project	3.10
Shortages of materials	Contractor	3.03
Additional works	Project	3.00
Shortages of skilled workers	Contractor	2.97
Slow inspection of completed works	Consultants	2.97
Slow information flow between parties	Project	2.93
Incompetent subcontractors/contractor	Contractor	2.90
Inaccurate estimates	Consultants	2.87
Obstacles from government (Government Projects)	External	2.87
Financial difficulties of contractor	Contractor	2.73
Unforeseen site conditions	Project	2.60
Poor contract management	Consultants	2.57
Obsolete or unsuitable construction methods	Contractor	2.53
Bad weather conditions	External	2.10

In table 5 the factors are grouped according to the category of respondents and an aggregate score obtained for each category to evaluate which group has the most influence on project time and cost performance. The statistics in table 5 suggest that employer related factors have the most impact on project performance. This is followed by Contractors' and consultants' respectively.

**Table 5: Ranking of impacting factors with group aggregate scores**

Category	Factor	Mean
Consultants	Unethical Practices	3.63
	Poor project management assistance	3.36
	Mistakes in design	3.23
	Slow inspection of completed works	2.97
	Inaccurate estimates	2.87
	Poor contract management	2.57
	Aggregate Score	3.11
Contractors	Mistakes during construction	3.70
	Unethical Practices	3.63
	Poor site management and supervision	3.53
	Shortages of materials	3.03
	Shortages of skilled workers	2.97
	Incompetent subcontractors/contractor	2.90
	Financial difficulties of contractor	2.73
	Obsolete or unsuitable construction methods	2.53
	Aggregate Score	3.13
Employers	Financial difficulties of owner (on private funded projects)	3.80
	Unethical Practices	3.63
	Financial difficulties of owner (on Government projects)	3.57
	Slow payment of completed works	3.21
	Aggregate Score	3.55
External	Price fluctuations	3.58
	Obstacles from government (Government Projects)	2.87
	Bad weather conditions	2.10
	Aggregate Score	2.85
Project	Design changes	3.10
	Additional works	3.00
	Slow information flow between parties	2.93
	Unforeseen site conditions	2.60
	Aggregate Score	2.91

It is interesting to note that financial difficulties of the employer (private and government) are ranked high as impacting on time and cost performance of projects. This is somewhat similar as in the Ghanaian study (Frimpong, Oluwoye and Crawford 2003), in which payment difficulties was found to be one of the top factors to impact on cost performance of projects. The financial difficulties of employers is likely to lead to delayed payments to contractors who in turn may slow progress of work or suspend work all together. Another important finding in this study is the perception of the impact of unethical behaviour on performance. Unethical behaviour such as corruption, awarding of contracts to unqualified contractors, disregard of appropriate tender procedures were highlighted as some of the unethical behaviour in the construction industry. Such practices may result in the appointment of a contractor who is unqualified to undertake the project and therefore lead to poor project performance.

Mistakes during construction are very much related to contractor's site management activities. Poor site management has been identified by others studies as being one of the top five factors. Le-Hoal, Lee and Lee (2008) and Sambasivan (2008) for example also rank this factor highly. The fifth most critical factor in this study relates to price fluctuations. Perhaps this reflects the type of contract that is mostly used which allows for fluctuations. It is not uncommon for contracts in the Zambian construction industry to include provisions for recovery of cost increase due to fluctuations. A related factor was identified in Frimpong, et al's (2003) in the Ghanaian construction industry in which they ranked inflation as the fourth most important factor to impact on cost performance of projects. The impact of bad weather is unsurprisingly relatively of little impact given the climate of the country.

The nation's climate rarely experience extreme weather conditions that would significantly impact on progress on construction projects. This is in contrast to countries like Kuwait (Koushki 2005) where the weather factor is an important consideration.

Table 5 shows the average aggregate rating of the different groupings. The values suggest that on average the employer factors (3.55) are the most critical in influencing project performance in the Zambian construction industry. This is followed by contract (3.13), consultant (3.11), project (2.91) and external factors (2.85). Clearly however the three, employers, contractors, and consultants, share the blame in poor project performance as the differences between their aggregate scores are minimal. Significantly for the employer the factors are mostly related to financial issues. Consideration of key factors for both contractors and consultants show that the major contributing factors relate to mistakes in design and construction and also poor construction project management practices.

## **5. Conclusion**

The purpose of the study was to examine factors that impact on the time and cost performance of construction project in Zambia. It is acknowledged that studies have shown that there are significant national and geographical differences when considering project impacting factors. The study on the Zambian construction industry was therefore appropriate and contributes to knowledge on this subject. A number of factors such as financial difficulties, site management and price fluctuations are ranked high similar to other studies. However the relating ranking of the factors were different from other studies. An important including in this study is the unethical practice factor. The authors are not aware of the inclusion of this factor in the context of studies on factors impacting on project performance in any other study and therefore consider this as a significant contribution. It was indicated in the literature review that the differences in perception of factors that impact on project performance may be due to the individual country or industry characteristics. Indeed this was clearly seen in this study where, for example, weather conditions were perceived to have the least influence among the factors identified. This is in contrast to other countries which experience extreme weather conditions. The results suggest that the improvement of time and cost performance in the Zambian construction industry will significant depend on, among other, clients resolving their project financial planning. An important contribution that both contractors and consultants can make to improve time and cost performance is to examine their management practices. The findings also suggest the significant impact of unethical behavior on time and cost performance. The authors recommend further empirical studies on this factor on construction project performance.

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